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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/566,344

08/03/2006

Sung-Man Lee

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3488

23413 7590 06/07/2010  
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EXAMINER

BEST, ZACHARY P

ART UNIT

PAPER NUMBER

1795

NOTIFICATION DATE

DELIVERY MODE

06/07/2010

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

usptopatentmail@cantorcolburn.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/566,344	<b>Applicant(s)</b> LEE ET AL.	
	<b>Examiner</b> Zachary Best	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 17 March 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) 1-4 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 6-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 January 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |                                                                                                                                   |                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                                               | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>20060127</u> . | 6) <input type="checkbox"/> Other: _____                                                |

**NEGATIVE ACTIVE MATERIAL FOR LITHIUM SECONDARY BATTERY  
AND METHOD FOR PREPARING SAME**

Examiner: Z. Best    S.N. 10/566,344    Art Unit: 1795

***Election/Restrictions***

1.        Claims 1-4 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on March 17, 2010. The traversal is on the ground(s) that a (1) complex comprising an oxide surrounding Si phase particles is distinct from a (2) composite which silicon crystallites are dispersed in silicon dioxide and there is no serious on the Examiner. This is not found persuasive because the aforesaid (2) composite is specific to the claimed (1) complex. They are only distinct in that the (1) complex is generic to the (2) composite. Furthermore, there will be a serious burden on Examiner because regardless of search method, the inventions of different limitations will require different search strategies, and the time and effort to consider the relevancy of the collective references would increase proportionally resulting in a serious burden to Examiner. The requirement is still deemed proper and is therefore made FINAL. Claims 5-10 are currently pending examination.

***Specification***

2.        The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 5-10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. It is Examiner's position that due to the breadth of the claims with regard to "a material having an absolute value of oxide formation enthalpy greater than that of the silicon oxide and also a negative oxide formation enthalpy" which would create the claimed complex as claimed in Claims 5-6 and 10 would require undue experimentation. It is noted that in the instant specification only metallic aluminum is provided as a working example of said material. The further limitation of the material in Claim 6 provides little more direction by Applicant, and in view of the specification and working examples may amount to misdirection. For example, Claim 6 lists the material may comprise Al and the working example provides metallic aluminum. It is officially noted that the enthalpy of formation for  $\text{Al}_2\text{O}_3$  would meet the claimed limitations. However, the enthalpy of formation of, for example, magnesium oxide or a boron oxide would not meet the claimed limitation. See CCCBD List of species with enthalpy of formation at 0 K (attached). It is reasoned that Applicant

believes some Mg or Mn compound would produce the claimed complex compound, but Applicant provides no further direction as to how one skilled in the art would find the necessary material based on the broad list of elements in Claim 6. For the forgoing reasons, Claims 5-10 fail to comply with the enablement requirement because the breadth and lack of direction in finding the claimed material, apart from metallic aluminum, would require undue experimentation.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 5-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "ultra-fine" in Claims 5 and 10 is a relative term which renders the claim indefinite. The term "ultra-fine" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Appropriate correction or clarification required.

Claim 5 recites the limitation "carbon material." There is insufficient antecedent basis for this limitation in the claim. Examiner suggests amendment to "a carbon material."

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 5, 7, and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by  
Aramata et al. (US 2003/0215711 A1).

Regarding Claims 5 and 10, Aramata et al. teach a method for preparing an anode active material (abstract) comprising producing a complex composed of ultrafine Si particles and an oxide surrounding said particles (par. 24) by mixing a silicon oxide and an organic gas, such as butane, and subjecting them to a thermochemical reaction to reduce the silicon oxide (pars. 12 and 38), and mixing the complex and carbon material (par. 55). It is reasoned that because the organic gas, such as butane, will reduce the silicon oxide it will inherently have a greater absolute oxide formation enthalpy than the silicon oxide, and butane has a negative oxide formation enthalpy (enthalpy of combustion).

Regarding Claim 7, Aramata et al. teaches pulverizing the Si phase-containing oxide complex and carbon material and suggests a ball mill as a means to reduce particle size (par. 74).

9. Claims 5, 6, 9, and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Gao et al. (US 2006/0057463).

Regarding Claims 5, 6, 9, and 10, Gao et al. teach a method for preparing an anode active material (abstract, claim 16) comprising producing a complex composed of ultrafine Si particles and an oxide surrounding said particles (par. 9) by mixing a silicon oxide and lithium metal, which adds Li<sub>2</sub>O to the complex (par. 31), and subjecting them to a thermochemical reaction to reduce the silicon oxide (pars. 48-49), and mixing the complex and carbon material (par. 87), wherein lithium metal will more readily form an oxide than silicon (par. 52).

***Claim Rejections - 35 USC § 103***

10. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aramata et al., as applied to Claims 5, 7, and 10 above, and further in view of Matsubara et al. (US 2002/0164479 A1).

Regarding Claim 8, Aramata et al. teach coating the surface of a silicon compound with carbon (par. 10), and creating a composite material with the silicon compound and a conductive agent, such as graphite (par. 55). However, Aramata et al. fail to teach coating both the silicon compound and conductive agent, which combined create a composite material, with a low crystalline or amorphous carbon material.

Matsubara et al. teach a method for preparing an anode active material (abstract, par. 2), wherein an amorphous carbon layer coats a composite material of a silicon compound

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and graphite (abstract) in order to improve discharge capacity and cycle-life characteristics (abstract). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to coat the composite material of Aramata et al. because Matsubara et al. teach coating the composite material of a silicon compound and graphite will improve discharge capacity and cycle-life characteristics.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zachary Best whose telephone number is (571) 270-3963. The examiner can normally be reached on Monday to Thursday, 7:30 - 5:00 (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Zachary Best/  
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/  
Supervisory Patent Examiner, Art Unit 1795